



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,096	07/16/2003	Robert B. Ford	02022 (3600-394-01)	9273

7590 03/21/2005

Martha Ann Finnegan, Esq.
Cabot Corporation
157 Concord Road
Billerica, MA 01821-7001

EXAMINER

VERSTEEG, STEVEN H

ART UNIT	PAPER NUMBER
----------	--------------

1753

DATE MAILED: 03/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/621,096

Applicant(s)

FORD ET AL.

Examiner

Steven H VerSteeg

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 September 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 29-31 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28, 32 and 34-36 is/are rejected.
- 7) ☒ Claim(s) 37 and 38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/9/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: See Continuation Sheet.

Continuation of Attachment(s) 6). Other: IDS mailroom date 4/16/04 & 9/3/03.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-28, 32, and 34-38, drawn to a monolithic sputtering target assembly and method of recycling it, classified in class 204, subclass 298.13.
 - II. Claims 29-31 and 33, drawn to a method of doing business, classified in class 705, subclass 1+.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case the product as claimed could be used in a materially different process such as a method of doing business whereby the target owner is charged for the entire target, including the unused portion, and the target is not returned.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Martha Ann Finnegan on March 11, 2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-28, 32, and 34-38. Affirmation of this election must be made by applicant in replying to this Office

Art Unit: 1753

action. Claims 29-31, and 33 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

6. The disclosure is objected to because of the following informalities: the last word at page 11, line 2 of the specification is not clear. Please resubmit the paragraph.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Claim 10 recites the limitation "said at least a portion of said backing plate portion" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. I recommend making claim 10 depend from claim 9 to overcome this rejection.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 1-6, 12, and 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,809,393 to Dunlop et al. (Dunlop).

12. For claim 1, Applicant requires a monolithic sputtering target assembly comprising a one piece assembly made from the same metal. For claim 2, Applicant requires the metal to comprise tantalum. For claim 3, Applicant requires the metal to comprise niobium. For claim 4, Applicant requires the metal to comprise cobalt. For claim 5, Applicant requires the metal to comprise titanium. For claim 6, Applicant requires the metal to comprise a valve metal.

13. Dunlop discloses a sputtering target comprising tantalum, niobium, cobalt, or titanium (col. 4, l. 22-39). The sputtering target is considered to be monolithic because there is no disclosure of a backing plate so the entire sputtering target assembly is subject to sputtering.

14. For claim 12, Applicant requires the metal to have a purity of 99.5% or greater. Dunlop discloses that the sputtering target can be aluminum with 99.5% purity (col. 8, l. 16-19).

15. For claim 16, Applicant requires the metal to have a texture of (111) on the surface or throughout the metal. For claim 17, the texture is (100). For claim 18, the texture is (111) as a

Art Unit: 1753

primary or mixed throughout the metal. Dunlop discloses a metal sputtering target with a (100) texture (col. 6, l. 24-27) or a (111) texture (Figure 11).

16. Claims 1, 5, and 13-15 are rejected under 35 U.S.C. 102(e) as being anticipated by US 2004/0119131 A1 to Turner.

17. Claims 1 and 5 are described above. Claim 13 requires the average grain size to be about 300 microns or less. Claim 14 requires the average grain size to be about 100 microns or less. Claim 15 requires the average grain size to be about 25 microns or less. Turner discloses a monolithic sputtering target material of 95% titanium with an average grain size of 8.8 microns (Figure 5).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims 1-3, 5-8, 11, 12, and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,503,380 B1 to Buehler in view of US 4,849,605 to Nakamori et al. (Nakamori).

20. Claims 1-3, 5, 6, and 12 are described above. For claim 7, Applicant requires the one piece assembly to comprise a sputtering target blank portion and a backing plate portion. For claim 8, Applicant requires the backing plate to comprise a flange portion. For claim 11, Applicant requires the flange portion to have a higher yield strength and/or is more rigid than the sputtering target blank portion. For claim 19, Applicant requires a sputtering target assembly

Art Unit: 1753

comprising a backing plate and a target blank where the backing plate is a valve metal, cobalt, titanium or alloys thereof, and the target comprises a metal. For claim 20, the target and backing plate are the same metal. For claim 21, the metal is tantalum. For claim 22, the metal is niobium. For claim 23, the metal is titanium. For claim 10, the backing plate is not recrystallized.

21. Buehler discloses a sputtering target comprising a backing plate **104**. The target can comprise metallic materials, such a high purity metal like titanium at 99.995% (col. 3, l. 9-13). The backing plate can comprise an electrically conductive material (col. 3, l. 14-17). The backing plate has a flange that would obviously be more rigid than the target to hold it to the chamber (Figure 3). There is no indication that the backing plate is recrystallized.

22. Buehler does not disclose the sputtering target and backing plate to be from the same metal or the backing plate to be a valve metal, cobalt, or titanium

23. Nakamori discloses that tantalum, niobium, and titanium are metals and that they are conductive (col. 3, l. 8-12) and can be sputtered from a target (col. 3, l. 13-20).

24. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Buehler to utilize tantalum, titanium, or niobium as the sputtering target and backing plate because they are metals and are conductive.

25. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,503,380 B1 to Buehler in view of US 4,849,605 to Nakamori et al. (Nakamori) as applied to claim 7 above, and further in view of US 5,772,860 to Sawada et al. (Sawada).

26. For claim 9, Applicant requires the target blank portion to be at least partially recrystallized.

Art Unit: 1753

27. Buehler in view of Nakamori is described above, but does not disclose the target to be partially recrystallized.

28. Sawada discloses a sputtering target of titanium with controlled crystal characteristics (abstract) including a recrystallization structure (abstract). The benefit is better film thickness distribution.

29. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Buehler in view of Nakamori to utilize a recrystallized titanium because of the desire to produce more uniform film thickness on a substrate.

30. Claims 1, 4, 7, 8, 10, 11, 19, 20, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,503,380 B1 to Buehler in view of US 6,197,166 B1 to Moslehi.

31. Claims 1, 4, 7, 8, 10, 11, 19, and 20 are described above. Buehler is described above. Buehler does not disclose the metal to be cobalt.

32. Moslehi discloses that cobalt is a conductive metal that can be sputtered (col. 1, l. 64 – col. 2, l. 2).

33. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Buehler to utilize cobalt as the target and backing plate because of the desire to utilize a conventionally utilized conductive target metal target material.

34. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,503,380 B1 to Buehler in view of US 6,197,166 B1 to Moslehi as applied to claim 7 above, and further in view of US 5,772,860 to Sawada et al. (Sawada).

35. For claim 9, Applicant requires the target blank portion to be at least partially recrystallized.

Art Unit: 1753

36. Buehler in view of Moslehi is described above, but does not disclose the target to be partially recrystallized.

37. Sawada discloses a sputtering target of titanium with controlled crystal characteristics (abstract) including a recrystallization structure (abstract). The benefit is better film thickness distribution.

38. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Buehler in view of Moslehi to utilize a recrystallized titanium because of the desire to produce more uniform film thickness on a substrate.

39. Claims 25-28 and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/00112955 A1 to Aimone et al. (Aimone) in view of US 5,809,393 to Dunlop et al. (Dunlop).

40. For claim 25, Applicant requires a method of recycling a sputtering target comprising providing a monolithic sputtering target assembly of claim 1; sputtering the target to form a spent monolithic sputtering target assembly; and recycling the target assembly.

41. Aimone discloses a method of recycling a refractory metal target [0003]. Aimone does not disclose the specific target to be a monolithic target, but can be applied to any general refractory metal target.

42. Dunlop is described above.

43. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Aimone to recycle the tantalum target of Dunlop because of the desire to save money and materials and not have to create a brand new sputtering target.

Art Unit: 1753

44. For claim 26, Applicant requires melting down the metal. For claim 27, Applicant requires filling the cavities in the spent target assembly. For claim 28, Applicant requires redepositing metal on the spent target to form a new target. Aimone discloses the limitations [0016] by discussing melting and filling with powders.

45. For claim 34, Applicant requires the metal to be consolidated powder metal. For claim 35, Applicant requires the metal to be an ingot derived metal. For claim 36, Applicant requires a portion of the target to comprise consolidated powder and another portion to comprise ingot derived metal. The portion not used (i.e. spent target part) is ingot made, and the added powder is powder metal.

46. Claims 25-28, 32, and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/00112955 A1 to Aimone et al. (Aimone) in view of US 6,503,380 B1 to Buehler and US 4,849,605 to Nakamori et al. (Nakamori).

47. Claims 25-28 and 34-36 are described above. For claim 32, Applicant requires a method of recycling a sputtering target comprising providing a monolithic sputtering target assembly of claim 19; sputtering the target to form a spent monolithic sputtering target assembly; and recycling the target assembly.

48. Aimone, Buehler, and Nakamori are described above.

49. Aimone does not disclose the specific target to be a monolithic target, but can be applied to any general refractory metal target.

50. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Aimone to recycle the tantalum target of Buehler and

Art Unit: 1753

Nakamori because of the desire to same money and materials and not have to create a brand new sputtering target.

Allowable Subject Matter

51. Claims 37 and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

52. The following is a statement of reasons for the indication of allowable subject matter: it is neither anticipated nor obvious over the prior art of record to have a monolithic sputtering target assembly as claimed by Applicant in claims 37 and 38.

53. Neither Moslehi nor Buehler nor Aimone nor Nakamori nor Dunlop nor Turner nor Sawada discloses the sputtering target assembly to be substantially void of either (100) or (111) textural bands.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.


Art Unit: 1753

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Steven H VerSteeg
Primary Examiner
Art Unit 1753

shv
March 15, 2005